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A TRAP FOR TREE-INHABITING CERAMBYCIDS

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Abstract. To determine species and numbers of insects visiting a tree, a paper trap for cerambycids was designed and tested on locust borers, *Megacyllene robiniae* (Forster), and red oak borers, *Enaphalodes rufulus* (Haldeman), under plantation and forest conditions. Test results showed that the trap could be used successfully to capture locust borers but it requires some modification for red oak borers. Several other cerambycid species were also captured in the trap.

Most traps for treeclimbing insects are designed as barriers to repel the insects. These barriers of sticky bands are not useful for determining species and numbers of insects visiting a tree because the insects usually are repelled or manage to escape. Compton and Flint (1927) found that locust borers, *Megacyllene robiniae* (Forster), were readily caught in Tanglefoot[1] bands on trees but were not killed and soon freed themselves of most of the substance.

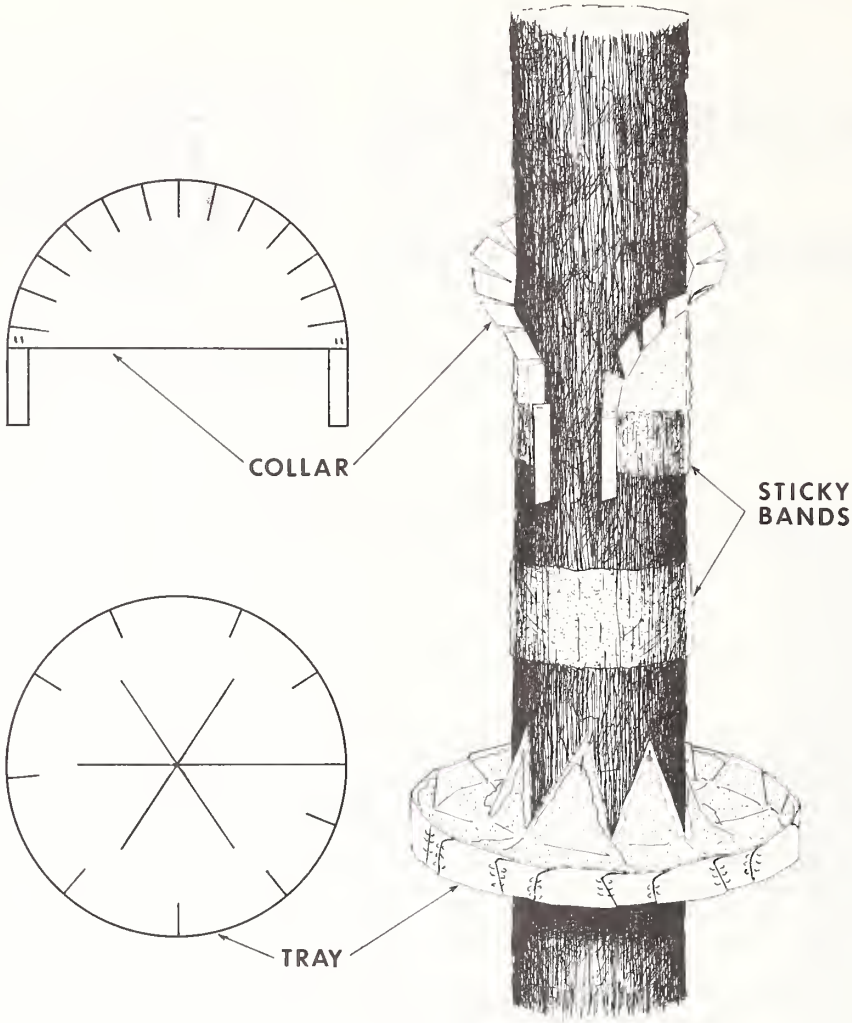
Studies I am now conducting on cerambycid pheromones required a trap that would capture the locust borer and the red oak borer, *Enaphalodes rufulus* (Haldeman), so that the approximate number of beetles visiting a tree could be determined. Following is the description of a trap that I designed and field tested in September and October of 1976 on locust borers, and in June and July of 1977 on red oak borers.

MATERIALS AND METHODS

The trap was constructed as follows: circles of 20, 25, 30, 35, 40, and 50 cm diameter were cut out of Insect Trap Paper, .016 grade, polyethylene coated 2-sides (Griff Associates, Fort Washington, Pa. 19034).[1] A circle that was 20 cm in diameter made a tray trap for a tree that was 10 cm dbh. Each increase of 5 cm in circle diameter made a tray that would fit a tree 2.5 cm larger. Two circles were stapled together to provide more rigidity for traps 35 cm in diameter and larger.

[1]The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement or approval by the U. S. Departent of Agriculture or the Forest Service of any product or service to the exclusion of others that may be suitable.

Figure 1.—Components of paper trap designed to capture locust borers and red oak borers, and its placement on the tree.



From one edge of each circle, a cut was made through the center to within approximately 5 cm of the opposite edge (Fig. 1). Four more cuts, equidistant from the first cut, were made radially from the center of the circle to within 5 cm of the edge. Along the outside edge, cuts were then made about 9 cm apart and 2 cm toward the center of the circle. The cut edges were then folded vertically so that they overlapped, and they were all stapled together except the original cut from the outside edge.

The collar with funneling tabs was constructed as follows: a circle was cut in half and cuts about 3 cm apart and 3 cm deep were made along the curved edge of the hemisphere; an aluminum tag (2 x 9 cm) with cardboard backing was stapled at each end of the straightangle edge.

The tray and collar were fastened to the tree as shown in Figure 1. A thick application of Tack Trap (Animal Repellents, Inc., Griffin, Ga. 30224)[1] was spread inside and up onto the fingers of the trap with a spatula. Tack Trap was applied around the stem about 10 cm above the trap and along the back edge of the collar and tabs to make sticky bands. The Tack Trap used for the bands had been heated to the boiling point to drive off some of the solvent so it could be applied thickly without running down the tree.

In 1976, 53 traps were placed in black locust trees in a plantation near Delaware, Ohio, to capture locust borers. Thirty-three traps had funneling collars, 20 were without. In 1977, 50 traps without funneling collars were placed on red, black, white, and scarlet oaks in southern Ohio to capture red oak borers.

RESULTS

In 1976, 1,148 female and 947 male locust borers were caught. Traps with funneling collars caught many more female than male borers while traps without collars caught more male. Evidence from visual observations showed that males ran rapidly up and down trees, especially when they detected female pheromone (Galford 1977). Thus they readily ran into the sticky band, and eventually fell into the tray. However, if they ran into the funneling collar, they often turned and ran back up the tree. Females, however, moved slowly, feeling the surface of the tree with their ovipositors, seeking oviposition sites; those on trees without collars would often contact the sticky band and back away without being caught. When they ran into a collar, however, many worked their way around it and down between tne tabs. Then, when one contacted the sticky band and backed away, it usually was unable to find the opening between the tabs and eventually was caught. None of the beetles was observed to fly away.

The importance of tree location and temperature to number of beetles caught was shown by the fact that more beetles were caught in traps in trees receiving late afternoon sunlight than those in the shade, except when the temperature exceeded 26°C. Then as many or more beetles were caught in traps that were in the shade.

Tree diameter and roughness of bark did not influence the number of beetles caught. In a trap on the largest tree—17 cm dbh with very rough bark—121 beetles were caught, while in one on the smallest tree—8 cm dbh and with smooth bark—97 were caught.

Proximity of locust trees to goldenrod (*Solidago* spp.), which adult beetles frequent, became a factor in the number of beetles caught. Late in the insects' flight period, when they apparently were moving from the flowers to the trees, more beetles were caught in traps in trees near goldenrod.

Hourly checks of the traps on certain days indicated that about 2 to 3 percent of the beetles caught in the sticky band managed to escape by falling between the finger openings, or by locating the opening between the funneling tabs.

The average trap was effective for about 3 weeks. The Tack Trap could be partially rejuvenated by scuffing it when it developed a dull, hazy gloss.

In 1977, 19 red oak borers were caught in 50 traps in southern Ohio. While this was a low catch, examinations of the trees indicated that there were few beetles per acre. Twenty-three of the traps were in areas of very low beetle populations and yielded only two beetles. Seventeen of the beetles were caught in the 27 traps in areas of moderate to high beetle population.

Eighteen of the 19 beetles caught were females, which indicates a selective catch for females because the sex ratio of red oak borers is 1:1 according to laboratory and field data. Male beetles may not have ventured as far down the tree as the height of the traps, or they may have detected the sticky band with their long antennae and backed away before they were caught. Females, however, feel the bark surface more with their ovipositors and less with their antennae and thus are more likely to be caught. However, since it was felt that collars might reduce the catch of beetles and so were not used, some beetles may have escaped. A very large opening between the funneling tabs would have been necessary to accommodate the long antennae of the beetles and on trees 10 to 20 cm dbh, this would have cancelled the effectiveness of collars.

In addition to the locust borers and red oak borers, many other species of cerambycids frequenting oak were caught, some in greater numbers than the red oak borers. The species were: oak sapling borer, *Goes tesselatus* (Hald.); living-beech borer, *Goes pulverulentus* (Hald.); red- headed ash borer, *Neoclytus acuminatus* (F.); oak-stem borer, *Aneflormorpha subpubescens* (Lec.); tile-horned prionus, *Prionus imbricornis* (L.); rustic borer, *Xylotrechus colonus* (F.); brown prionid, *Orthosoma brunneum* (Forst.); *Sarosesthes fulminans* (F.); *Elaphidionoides incertus* (Newman); ivory-marked beetle, *Eburia quadrigeminata* (Say); *Graphisurus fasciatus* (DeG.); and *Leptura emarginata* (F.).

Wildlife—such as birds, mice, and flying squirrels—did not cause problems in 1976 in the

black locust plantation. In 1977, however, under forest conditions, some animals were caught in the traps. Mice climbed the trees and got stuck in the Tack Trap, which in turn attracted blow flies and carrion beetles; this quickly made the traps useless. A small band of Tack Trap applied on the tree about 30 cm above the ground will keep mice out of the traps. Flying squirrels and birds were readily trapped until it was discovered that if the diameter of the trap did not exceed the diameter of the tree by more than 16 cm the animals were apparently able to jump clear of the tray after contacting the sticky band. No birds or flying squirrels were caught in the smaller traps. Thus the traps appear to be useful for some survey and test situations. Some modifications of the traps may be necessary, depending upon the research situation and the insect species involved.

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